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GEOLOGY AND PALEONTOLOGY.

The Origin of the Sycamore.—The American origin of our sycamore was long denied by European botanists, and was only rendered certain by its discovery in a fossil state by Prof. Lesquereux in a late deposit of the Mississippi valley. Specimens were sent to that great authority on these subjects, Dr. Oswald Heer, of Zurich, who could find no characters by which to distinguish the fossil from the living form, and who regards this as a final settlement of the question. But through the researches of Lester Ward we now learn that the genus itself, the entire type of vegetation to which the plants belong, is American, and that numerous and strange archaic forms of this type formed umbrageous forests on the shores of the great inland Laramie sea where the Rocky Mountains stand, and of the ocean at a time when it extended northward across what are now the great plains of the United States and Canada. (Proc. U. S. Nat. Mus., Vol. XI.)

The Cuboides Zone.—In a paper read before the Geol. Soc. Am., Dec. 28, 1889, by H. S. Williams, the author concludes, after a study of the Cuboides zone and the Tully limestone, that within narrow limits, geologically speaking, the point in the European time scale represented by the beginning of deposition of the Cuboides Schichten of Aix la Chapelle and Rüdesheim, is represented in New York sections by the Tully limestone; and second, that the representative of the fauna of the Cuboides zone of Europe is seen in New York, not only in the Tully limestone, but in the shaly strata for several hundred feet above.

Therefore, if we wish to express precise correlation in our classification of American rocks, the line between Middle and Upper Devonian formations should be drawn at the base of the Tully limestone, to correspond with the usage of French, Belgian, German, and Russian geologists, who include the Frasnian, Cuboides Schichten, and correlated zones in the Upper Devonian.

In discussing the subject Mr. C. D. Walcott remarked: "Prof. Williams' paper is of unusual interest, as he has shown very clearly that the theory of Huxley that there is no homotaxial relation between the sub-division of the geologic systems on the American and European continents is not altogether correct. This study of the Cuboides zone has shown one limited horizon, at least, that is widely distributed in Europe which is also readily recognized in the state of New York."

The Echinodermata of the Carboniferous.—C. R. Keyes, in the *Am. Jour. Sci.*, Sept. 1889, discussing the Carboniferous Echinodermata of the Mississippi basin, recapitulates as follows:

It appears that (1) the most characteristic faunal group was preeminently dual in its general aspect, the Crinoidea greatly predominating during the first part and the Blastoidea during the latter portion of the period; (2) that a large proportion of the genera of Echinoderms became extinct toward the close of the Keokuk; (3) that of the Crinoidal genera represented in the St. Louis and Chester, nearly one-half of the number did not occur in the earlier epochs; (4) that among the Crinoidea in general the abrupt and extensive differentiation in certain anatomical features toward the end of the Keokuk are suggestive of decided changes in the biological and physical conditions of environment; (5) that the faunas of the Burlington and Keokuk are very closely related genetically, the two being practically continuous; (6) that if the members of the Lower Carboniferous of the Mississippi are to be synchronized with the two divisions of the Appalachian Lower Carboniferous, the line of demarkation is far more apparent at the close than at the beginning of the Keokuk epoch.

A Recent Find of Castoroides.—Interest attaches to a recent find of *Castoroides ohioensis*, since the species, though known since 1838, has heretofore been studied from rather meagre fragments. This find, which was made in Indiana is well nigh a complete skeleton.

The parietal and occipital regions of the skull are wanting, but they have been well studied already. The dentition, however, is perfect, both above and below, and is more fully developed than in the Clyde skull found in 1840. The vertebræ in front of the pelvis are all present, except two of the dorsal and four of the cervical. The two most important, the atlas and axis, were found.

The shoulder-blades, clavicles, and fore-legs, minus the feet, show an animal powerfully developed anteriorly. The tail is proportionally about as long as that of the beaver. Everything about it indicates that it was an important and powerful member. In the middle and more posterior region the transverse processes are broad, heavy, and bifurcate, as in the beaver, but relatively not nearly so long. If its tail was flat it was not so wide as that of the beaver. It was five-toed and plantigrade.

The fourth metatarsal is the longest and stoutest bone of the series. The fifth does not join to the tarsus, but articulates with the outer under side of the base of the fourth. It could hardly have the skeleton of the foot in so many respects like that of the beaver, and not have been web-footed. The entire length of the foot must have been fully twelve inches.

The general size and character of the skeleton sustain the conclusions of Dr. Wyman and others that the animal was "as large as a black bear."—JOSEPH MOORE, *Richmond, Ind.*

Geological News.—General.—H. A. Wasmuth maintains that in "bedded" mineral deposits no "inversion" or "overlapping" of the strata can take place without fracture and more or less dislocation; and that, in general, the dislocations of the strata take place in one of two ways: either the portion of a mineral deposit on the hanging wall of the fracture or fault is in a lower position than the portion on the foot wall, or it is in a higher position. Occurrences of the former sort are called "transverse faults;" of the latter, "longitudinal faults," or overlaps. (Jour. Franklin Insti., Aug. 1887.)

Prof. N. S. Shaler suggests that the origin of the Florida uplift is in all probability the same as that of the "Cincinnati anticlinal," and that the peculiar sand-ridges found in the lake district have been shaped beneath ocean waters affected by strong currents. If this latter theory is true, then we are compelled to believe that the elevation of the area above the sea level took place with extreme suddenness. The problem in this field is substantially like that which we have in the Kame districts along the southern shore of New England. (Bull. Mus. Comp. Zool., Vol. XVI., No. 7.)

It is proposed by F. H. Knowlton (Proc. Nat. Mus., Vol XII., pp. 601–617), in his revision of the Araucarioxylon, to separate Cordaites from the other Paleozoic woods; and, in accordance with Felix's suggestion, to adopt Endlicher's name Dadoxylon for the remainder, and to restrict the use of Araucarioxylon to the Mesozoic and Tertiary forms.

Cretaceous.—R. T. Hill has published an annotated check-list of the Invertebrate Fossils from the Cretaceous Formations of Texas. It comprises 2 species of Protozoa, 8 Cœlenterata, 16 Echinodermata, 5 Bryozoa, and 59 Lamellibranchiata.

J. S. Diller has discovered a number of sandstone dikes in the Sacramento valley in California. Their position and the peculiar way in which they intersect the Cretaceous sandstones and shales, their banding and the appearance and position of the biotite in the dike rock, afford conclusive evidence that these dikes record seismic movement during the Tertiary. (Bull. Geol. Soc. Am., Vol I.).

G. M. Dawson proposes (*Am. Jour. Sci.*, March, 1890) the name Nanaimo Group instead of Dr. White's "Vancouver," to designate the equivalent of the Chico Group in the Vancouver Island region.

In the *Am. Jour. Sci.*, Oct. 1889, are some suggestions from G. H. Eldridge as to a method of grouping the formations of the Middle Cretaceous. He proposes to include in the lower of the more general divisions the formations of the Fort Benton and Niobara; in the upper, the Fort Pierre and Fox Hills; for the former no better name can be found than the one now in use, Colorado; for the latter the name Montana is now for the first time proposed. It is, however, etymologically objectionable, because it is found principally on the plains!

R. T. Hill does not concur in the proposed suggestion to abandon the Meek and Hayden sub-division of the Upper Cretaceous. If the beds lose their identity in Colorado, they appear in Texas in a manner which only confirms the original Nebraska section in its characters and succession. (*Am. Jour. Sci.*, Dec. 1889.)

Various widely scattered observations enable G. M. Dawson to state (*Am. Jour. Sci.*, Aug. 1889) that a great earlier Cretaceous formation, beneath the horizon of the Dakota, is more or less continuously developed over a vast tract of country, the eastern edge of which lies to the east of the present line of the Rocky Mountains, from the 49th parallel to the Arctic Ocean, and which is represented to the west as far as the vicinity of the mouth of the Fraser River, the Queen Charlotte's Islands, and in the Yukon Valley beyond the 141st meridian, in the interior of Alaska.

Mesozoic.—After a thorough study of rocks from twenty-six localities in the Connecticut valley, W. M. Davis and C. S. Whittle have come to the conclusion that the eastern trap ranges present a uniform association of the numerous characters of extrusive sheets, while the western trap range as consistently manifests the several characteristics of an intrusive sheet. (Bull. Mus. Comp. Zool., Vol. XVI., No. 6.)

A recent communication from R. Lydekker to the *Quar. Jour. Geol. Soc.*, 1890, contains an account of Iguanodont remains from the Wadhurst clay; a description of a metatarsus of a Megolausaurian (*M. dunkeri*) from the same deposit; and a note in regard to some vertebræ of a Sauropterygian.

In an address to the Cambridge Entomological Club, Jan. 10, 1890, Mr. S. H. Scudder gave the following brief *résumé* of recent knowledge of Mesozoic insects:

"The horizon has been extended of late years by the thorough discussion of the Bavarian insects by Deichmüller and by Oppenheim; by the careful exploitation of a new locality for Triassic insects at Dobbertin, Germany, by F. E. Geinitz; by the considerable number of new generic and specific types of cockroaches from the secondary rocks of England, described by myself; by the repeated though not extensive discoveries of Fritsch in Bohemia, adding interesting material for our very meager knowledge of Cretaceous insects; and by the discovery at Fairplay, Colorado, of a collection of Triassic cockroaches of special importance."

Palæozoic.—According to C. R. Keyes the remnants of an exceedingly rich and varied fauna that once tenanted the littoral zones of a vast Carboniferous sea, are found in the vicinity of Burlington, Iowa. The Gastropods of the Kinderhook beds include upwards of fifteen genera and fifty species. But only two of the generic groups, Platyceras and Straparollus, have thus far been recognized in the Burlington strata, in which there occur eight species of the first genus and two of the second. (Proc. Phila. Acad. Sci., Sept. 1889.)

S. A. Miller and F. E. Gurley have described (*Jour. Cin. Soc. Nat. Hist.*, April, 1890) some fine Crinoids from the Coal Measures and sub-Carboniferous rocks of Indiana, Nevada, and Iowa. A new family name, Eupachycrinidæ, is made to include the genera Eupachycrinus and Delocrinus, each containing two new species, and Ulocrinus, containing three. The remaining 45 new species are referred to 21 genera, of which four are new. This paper embraces more important novelties than any one recently published. It is well illustrated.

In the *Quart. Jour. Geo. Soc.*, May, 1890, two new species of Rhachitomous Stegocephali are described and figured by R. Lydekker, viz.: *Macromerium scoticum*, from the Carboniferous of Scotland; *Eryops owenii*, from the Karoo system of South Africa. The latter is the first representative of the North American Stegocephali found at the Cape.

W. B. Dwight has demonstrated from fossils collected in that region that the Calciferous is one of the most prominent components of the Millerton-Fishkill limestone belt.

Cænozoic.—In a paper entitled Structure and Origin of Glacial Sand Plains (Bull. Geol. Soc. Am., 1890) W. M. Morris states that his observations of the New England sand plains are in accordance with the generally accepted explanations.

E. T. Newton has recently described some Eocene siluroid fishes, *Arius crassus*, *Arius baroni*, and *Arius gagorides*. (Proc. London Zool. Soc., 1889.)

The Cernaysian Mammalia are reviewed in Proc. Phila. Acad. Sci., 1890, by H. F. Osborn. The collection is in the private museum of Dr. Victor Lemoine, and is not thoroughly known or appreciated abroad, except by those who have had the good fortune to examine the original types.

W. B. Clark (Bull. Geol. Soc. Am., Vol. I.) notes the strange commingling of different faunas in the Tertiary deposits of the Cape Fear region.

In a paper on Glacial Phenomena in Canada, Robert Bell discusses the causes of changes in level, and remarks that the elevation of the land still in progress in north polar regions indicates that we have passed the period of greatest warmth, and that a colder condition has again begun to creep upon us from the north.

G. F. Wright (Bull. Geol. Soc. Am., Vol. I.) defines the Oak Knolls, a part of the ridge separating Lake Ontario from Lake Huron, as a moraine of retrocession. This ridge probably existed as a long island in the great glacial Lake Erie-Ontario.

T. C. Chamberlin (Bull. Geol. Soc. Am., Vol. I.) presents some additional evidences bearing on the interval between the glacial epochs. These evidences are the trenching of the valleys of the Mississippi, Ohio, Allegheny, Susquehanna, and Delaware Rivers. The cutting of these trenches rudely measures the length of the interglacial interval.

At a meeting of the Phila. Acad. Sci., 1888, Otto Meyer determined a collection of fossil Tertiary invertebrates imbeded in sand which filled the inside of a *Balanus convexus* Brown, found on the west side of Chesapeake Bay. The list comprises 15 Gastropoda, 8 Lamellibranchiata, 1 Balanidæ, 1 Ostracoda, 3 Foraminifera.

R. Lydekker, in a recent paper (*Quart. Jour. Geol. Soc.*, 1890), submits sufficient evidence to prove beyond reasonable doubt the occurrence of the striped hyæna in the Tertiary of Val d' Arno.

G. M. Dawson calls attention (*Geol. Mag.*, Vol. I.) to the noteworthy heights at which glaciation has now been found to occur on some of the higher points in the southern interior of British Columbia. These heights range from 4340 to 7200 feet.

A recent study of the corresponding series of beds in the Paris and Hempstead basins leads Mr. A. Blytt to think that the attenuation of strata was effected by a general cause, and it seems highly probable that this cause is the precession of the equinoxes.

In the Proc. N. Y. Microscopical Soc., 1890, is found a synopsis of the Cretaceous Foraminifera of New Jersey, compiled by Anthony Woodward. The object of this paper is to bring together all the work that has been previously done, and the observations that have been made on the Cretaceous Foraminifera of New Jersey from 1833 to 1889.

Joseph Moore (*Jour. Cin. Soc. Nat. His.*, April, 1890) describes the tooth of a gigantic rodent found in northern Georgia. Its striking feature is the peculiar ribbing and flutting of the enamel throughout the length of the tooth. He proposes the name *Castoroides georgienis*. After an examination of the specimen, Prof. Cope states that it is the inferior canine of the *Hippopotamus amphibius*.

MINERALOGY AND PETROGRAPHY.[1]

Petrographical News.—A suite of rocks collected in Madagascar by Rev. R. Baron[2] has been examined by Hatch,[3] who separates them into gneisses, granitite, olivine-norite, pyroxene-granulites, pyroxenites, and basalts. In the olivine-norite the plagioclase is perfectly transparent, and has an undulous extinction. The olivine is surrounded by a reactionary rim consisting of an inner zone of hypersthene and an outer one of actinolite. The pyroxene-granulite is evidently a basic eruptive that has suffered dynamo-metamorphism. It contains pyroxene, hornblende, and garnet, besides the usual constituents of granulite. Among the basalts many varieties are described. In one variety, the augite and olivine, when present, are in porphyritic crystals, slightly corroded, and including portions of the microlitic ground mass. The augite is grouped around the olivine, which is twinned. A few grains of quartz are present. A second variety contains hornblende and biotite porphyritically developed. All the augite of this rock is zonal, with a different extinction in the various zones. In some the hour-glass structure was observed. Twinning is frequent. A glassy basalt includes hornblende crystals and fragments of quartz. Some of the hornblende has been entirely dissolved, and in its place has been formed an aggregate of augite and magnetite.

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[1] Edited by Dr. W. S. Bayley, Colby University, Waterville, Me.

[2] *Quart. Jour. Geol. Soc.*, XLV., May, 1889, p. 305.